THE MINERAL INDUSTRY OF NORTH KOREA

By John C. Wu

North Korea, which occupies the northern half of the Korean Peninsula, is located east of the Korean Bay and west of the Sea of Japan (the East Sea) between China and the Republic of Korea in East Asia. The country's total area is about 120,540 square kilometers, which is slightly smaller than that of Mississippi. As of July 2005, its population was about 22.9 million. Its economy remained tightly controlled and centrally planned by the North Korean Government. In 2005, North Korea's gross domestic product (GDP) and the GDP per capita based on purchasing power parity were estimated to be $40 billion and $1,800, respectively, and the country's real GDP growth was estimated to be 1% compared with 2.2% in 2004 (Bank of Korea, 2005§[1]; U.S. Central Intelligence Agency, 2005§). On the basis of North Korea's economic structure in 2004, the mining sector accounted for about 8.7% of North Korea's GDP (Bank of Korea, 2005§).

The country's identified important mineral resources are coal, copper, fluorspar, gold, graphite, iron ore, lead, limestone, magnesite, silver, tungsten, and zinc. Reserves of coal, iron ore, limestone, and magnesite are large by world standards. The country, however, has few reserves of natural gas and crude petroleum (National Intelligence Service of the Republic of Korea, 2004§; U.S. Library of Congress, 2005§).

In January 2005, the Government reportedly completed its 2004 geologic prospecting plan. Prospecting teams surveyed deposits of coal and iron ore and discovered potash, phosphate rock, and silica in the western part of the country. The North Hamgyong (Hamgyongbuk) Provincial Geological Prospecting Complex revised and updated its geologic survey data in the Musan area and delineated and confirmed the ore body (resources) of the Musan iron ore deposits using modern physical survey equipment. The North Pyongan (Pyonganbuk) Provincial Geological Prospecting Complex completed development of rare-earth mines and discovered natural mineral fertilizer in the area (Korea Central News Agency, 2005§).

To facilitate inter-Korea economic cooperation, which includes the expansion of Republic of Korea companies into the North Korean market, the Government of North Korea enacted the Inter-Korea Economic Cooperation Act in 2005. The Act, which is made up of 27 articles that are included in Government ordinance no. 1882 of the Presidium Supreme People's Assembly of July 6, was announced by the Government on July 29, 2005 (Ministry of Unification of the Republic of Korea, 2005b§).

On October 28, 2005, North Korea and the Republic of Korea opened their first joint office (Office of Inter-Korea Economic Cooperation) in an industrial park near Kaesong, which is located about 10 kilometers (km) north of the Demilitarized Zone, to promote trade through partnerships and direct deals across their border. The new office was staffed by 12 North Korean and 14 Republic of Korea economic officials to help businesses from both sides find partners and reach deals directly (North Korea Times, 2005§; Reuters, 2005§).

To cooperate on economic development between North Korea and the Republic of Korea, Korea Resources Corporation (Kores), which is a Republic of Korea state-owned natural resources development agency, announced in September 2005 that a liaison office would be set up in Pyongyang to handle mineral resource development. Kores indicated that it was engaged in talks with the North Korean Government to form a partnership for mineral-resource development projects that would focus on copper, iron ore, magnesite, and zinc. The Republic of Korea's Government would allow domestic private companies to join mineral-resource development projects in North Korea in the future through Kores-led consortia. The partnership negotiations on mineral-resource development projects included an initial $5.1 million project to mine graphite in Yonan County, South Hwanghae Province (Hwanghaenam-Do). By September 2005, Kores had constructed facilities for graphite mining, which was the first inter-Korean project in the mineral resource sector. The test operation of the facilities was carried out in November 2005. The graphite mine capacity was between 10,000 and 12,000 metric tons per year (t/yr). The graphite production would be shipped to the Republic of Korea beginning in 2006. The Republic of Korea state-owned Korea National Oil Corp. was seeking joint development of coal and oil resources as part of a large deal to expand bilateral cooperation (Chinadaily.com, 2004§; Korea Times, 2005§; Monstersandcritics.com, 2005§).

North Korea's mineral production included barite, coal, copper, fluorspar, gold, graphite, iron ore, lead, limestone, magnesite, phosphate rock, salt, silver, sulfur, talc, tungsten, and zinc. Production of processed minerals included cadmium, cement, coke, refined copper, ferroalloys, refined lead, magnesia clinker, nitrogen fertilizer materials, pig iron, steel, and refined zinc (table 1). In 2005, most of the country's mines and mineral-processing plants were still operated at below their design capacity because of outmoded facilities, a shortage of spare parts and energy (electricity and coking coal), and a lack of capital for renovation and modernization.

In 2005, North Korea's two-way trade totaled more than $3 billion compared with $2.86 billion in 2004. The increase in trade volume was largely owing to a 15% increase in trade with China to $1.58 billion in 2005. North Korea's trade with the Republic of Korea increased to $1.06 billion in 2005 from $697.04 million in 2004. North Korea's trade with Japan decreased to $195 million in 2005 from $253 million in 2004. In 2005, the main export commodities to China were marine products, minerals (coal and mineral ore), and steel; and the major imported commodities from China were cereals, meats, and mineral fuel (crude petroleum). The major export commodities to the Republic of Korea were agricultural and marine products, minerals, and steel and metal. The major import commodities from the Republic of Korea were agricultural and marine products, electrical and electronic products, and machineries. The main export items to Japan were electrical machineries, marine products, and mineral fuels; and the major import items from

[1]References that include a section mark (§) are found in the Internet References Cited section.

Japan were artificial filament textiles, automobiles, and electrical machineries (Ministry of Unification of the Republic of Korea, 2005a§, d§).

To revitalize and modernize its mining sector, the Government had sought foreign investors to invest in North Korea's mining industry. In 2004, investment opportunities in the mining sector were revealed to participating foreign companies. Investment opportunities that were made known to Chinese investors included the Changdo barite mine, the Liwon mica mine, the Songcheon nonferrous metals mine (copper, nickel, lead, and zinc), and the renovation of previously operated coal mines; additional investment opportunities in the production of bronze, calcium carbide, diatomite, gold, lithium, molybdenum, and titanium were also revealed. Investment opportunities in the mining sector revealed to German investors included the Susan titanium (ilmenite) mine in South Hwanghae Province (Hwanghaenam-Do), the Kamuri nonferrous metals (copper, gold, molybdenum, and platinum) mining district in North Hwanghae Province (Hwanghaebuk-Do), and the Pyongsan fluorite mine in North Hwanghae Province (Korea Trade-Investment Promotion Agency, 2004§; Wolfgang Hampel Geological Consultant, 2004§).

The mining sector provided fuel and raw materials to the manufacturing sector and earned substantial amounts of foreign exchange. Production of coal and iron ore was mostly for domestic consumption by the utility and iron and steel industries, but certain amounts of coal and iron ore were exported to earn foreign exchange. Limestone production was for consumption by the domestic cement and construction industries. Magnesite production was for the production of magnesia clinker for consumption by the domestic metal-manufacturing industries and for export.

Coal (mostly anthracite) was produced mainly from the Anju, the Kaechon, the Pukchang, the Sunchon, and the Tockchon areas in South Pyongan Province (Pyongannam-Do) and from the Saebyol area in North Hamgyong Province (Hamgyongbuk-Do). According to statistics published by Korea International Trade Association of North Korea, earnings from coal exports to China increased by 120% to $136.7 million for the first 11 months of 2005 from the same period in 2004 (Ministry of Unification of the Republic of Korea, 2005c§). According to statistics released by China's Customs Bureau, during January-November 2005, China imported 23.16 Mt of coal, of which 2.272 Mt was from North Korea (AAAmineral.com, 2005§).

In 2005, China Minmetals Corp. reportedly signed an agreement with North Korea's Ministry of Foreign Trade to establish a joint venture to renovate and operate the Yongtung Coal Mine, which was North Korea's first joint venture with foreign companies in the sphere of resources outside the special zone. Yongtung Coal Mines, which was one of the leading coal mines in North Korea, produced about 1 Mt/yr of anthracite (CanKor, 2005§).

Iron ore was produced mainly from the Musan Mine, which is located in North Hamgyong Province (Hamgyongbuk-Do) along the Tumen River near the Chinese border, and from the Ullyul (Unryul) Mine in South Hwanghae Province. The Musan Mine, which was purported to be the largest iron ore deposit in Asia, was said to have estimated ore reserves of between 3 billion and 7 billion metric tons (Gt). In 2005, North Korean iron ore production totaled about 5 Mt, of which more than 1 Mt of iron ore and concentrate was exported to China compared with 600,000 metric tons (t) in 2004 (MCN International Pte Ltd., 2005§).

In November 2005, according to Asia Times, Tonghua Iron & Steel (Group) Co. Ltd., which was a mid-sized state-owned steelmaker based in Tonghua City, Jilin Province in northeastern China, was expected to sign an $867 million 50-year exploration-rights deal with the Musan iron ore mine in North Korea. According to Tonghua Iron & Steel, the company hopes to receive 10 Mt/yr of iron ore from the Musan Mine as part of its plan to raise its steel production to a projected 5.5 Mt in 2007 and 10 Mt in 2010 from 2.5 Mt in 2004. According to Tonghua City local press reports, of the total investment of $867 million, about $248 million would be for infrastructure construction (transportation and power lines), and about $619 million, for equipment and technology for the mining project. Jilin's Yanbian Tianchi Stock Holding Co. and Sinosteel Corporation probably would join as partners in the project. The Musan Mine reportedly produced about 3 Mt/yr in recent years (Asia Times Online, 2005§; Metalsplace.com, 2005§; Resource Investor, 2005§; World Peace Herald, 2005§).

North Korea's nonferrous metals production reportedly had increased gradually to 98,000 t in 2004 from 94,000 t in 2003 and 87,000 t in 2002 after the Government introduced an incentive system through economic reform measures in 2003. The Komdok Mine in South Hamgyong Province (Hamgyognam-Do), according to an economic journal of the Republic of Korea, accounted for 60% to 70% of North Korea's lead and zinc production. The lead and zinc concentrates produced from the Komdok Mine were delivered to the Mungyong (Muncheon Geumgang) refinery near the town of Tancheon in South Hamyong Province. According the same journal, despite a recent workforce increase at the mine to encourage increased output for export, the production in the past 2 to 3 years remained below capacity owing to a lack of electricity for electrolysis and the low grade of ore mined (Open Source Center, 2005§; Ministry of Unification of the Republic of Korea, 2006§).

Outlook

For the next 4 to 5 years, the North Korea mining sector will continue to be dominated by coal, iron ore, limestone, and magnesite. The coal and iron ore mining activities and their production are expected to increase because of China's investment in the Musan iron ore mine and in the Yongtung anthracite coal mine. Because of China's growing demand for minerals, its investment in North Korea's mining sector is expected to increase and to extend beyond coal and iron into other minerals, such as copper, gold, molybdenum, and nickel.

North Korea's real GDP growth is expected to increase gradually to between 2% and 3% during the next 2 years.

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TABLE 1
NORTH KOREA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES[1, 2]

(Metric tons unless otherwise specified)

Commodity[3]		2001	2002	2003	2004	2005
METALS						
Cadmium metal, smelter		200	200	200	200	200
Copper:						
Mine output, Cu content		12,000	12,000	12,000	12,000	12,000
Metal:						
Smelter, primary and secondary		15,000 r	15,000 r	15,000 r	15,000 r	15,000
Refinery, primary and secondary		15,000	15,000	15,000	15,000	15,000
Gold, mine output, Au content	kilograms	6,600	6,600	6,300	6,000	6,000
Iron and steel:						
Iron ore and concentrate, marketable:						
Gross weight	thousand metric tons	4,200	4,100	4,430	4,580	5,000
Fe content	do.	1,200	1,150	1,260	1,300	1,400
Metal:						
Pig iron	do.	800	800	900	900	900
Ferroalloys, unspecified	do.	10	10	10	10	10
Steel, crude	do.	1,000	1,030	1,090	1,070	1,070
Lead:						
Mine output, Pb content		9,000	10,000	20,000	20,000	20,000
Metal:						
Smelter, primary and secondary		9,000	10,000	20,000	20,000	20,000
Refinery, primary and secondary		7,000	6,000	7,000	9,000 r	9,000
Silver, mine output, Ag content		20	20	20	20	20
Tungsten, mine output, W content		500	600	600	600	600
Zinc:						
Mine output, Zn content		60,000	60,000	60,000	62,000	67,000
Metal, primary and secondary		65,000	65,000	65,000	67,000	72,000
INDUSTRIAL MINERALS						
Barite		70,000	70,000	70,000	70,000	70,000
Cement, hydraulic	thousand metric tons	5,160	5,320	5,540	5,630	5,700
Fluorspar		12,000	12,000	12,000	12,000	12,500
Graphite		25,000	25,000	25,000	30,000 r	32,000
Magnesite, crude	thousand metric tons	1,000	1,000	1,000	1,200	1,200
Nitrogen, N content of ammonia	do.	100	100	100	100	100
Phosphate rock		350,000	300,000	300,000	300,000	300,000
Salt, all types		500,000	500,000	500,000	500,000	500,000
Sulfur	thousand metric tons	41	42	42	42	42
Talc, soapstone, pyrophyllite		60,000	50,000	50,000	50,000	50,000
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Anthracite	thousand metric tons	16,000	17,000	16,000	16,300	16,500
Lignite	do.	7,000	7,000	6,300	6,500	7,000
Total	do.	23,000	24,000	22,300	22,800	23,500
Coke	do.	2,000	2,000	2,000	2,000	2,000

rRevised.
[1]Table includes data available through April 28, 2006.
[2]Estimated data are rounded to no more than three significant digits; may not add to totals shown.
[3]In addition to the commodities listed, crude construction materials, such as sand and gravel and other varieties of stone, and refined petroleum products and rare earths presumably are produced, but available information is inadequate to make reliable estimates of output levels.

TABLE 2
NORTH KOREA: STRUCTURE OF THE MINERAL INDUSTRY IN 2005

(Thousand metric tons unless otherwise specified)

Commodity	Main operating companies and main equity owners	Location of main facilities	Annual capacity[e]
Cement	Sunchon Cement Complex	Sunchon in Pyongannam Province	3,000
Do.	Samgwong Cement Complex	Samgwong in Kangwon Province	2,000
Do.	Gomusan Cement Factory	Cheongjin, Hamgyongbuk Province	2,000
Do.	Cheonnaeri Cement Factory	Cheonae in Hamgyongnam Province	1,000
Coal	Anju Coal Mining Complex and Sunchon Coal Mining Complex	Anju, Kaechon, Pukchang, Sunchon, and Tokechon all in Pyongannam Province	9,500
Do.	Saebyol Coal Mining Complex	Saebyol in Hamgyongbuk Province	6,000
Gold, mine output, Au content kilograms	Kumsan (Gumsan) Joint-Venture Co.	Sierra near Changjin northwest of Hamhung, Hamgyongbuk Province	530
Iron ore, concentrate, gross weight	Ministry of Metal and Machines Industry, Department of Mines, Musan Iron Ore Mine Complex	Near the town of Musan, Hamgyongbuk Province	10,000
Do.	Unryul Mine	Unryul, Hwanghaenam Province	1,000
Lead:			
In concentrate	Korea Zinc Industrial Group	Komdok, near Tancheon, Hamgyongnam Province	20
Refined	do.	Munpyong, Kangwon Province	32
Magnesite, concentrate, gross weight	Korea Magnesia Clinker Industry Group	Dae Hung and Ryong Yang, Hamgyongnam Province Paek Bai near Kimchaek, Hamgyongbuk Province	2,500
Magnesia clinker	do.	Tanchon and Dae Hung, Hamgyongnam Province; Song Jin, Hamgyongbuk Province	1,150
Steel, crude	Ministry of Metal and Machines Industry:		
Do.	Kimchaeck Iron Works	Chongjin, Hamgyongbuk Province	2,400
Do.	Hwanghae (Hwanghai) Iron Works	Songnim, Hamgyongbuk Province	1,500
Do.	Kangson Works	Kangson, Hwanhaebuk Province	960
Do.	Chullima Steel Works	Nampo, Pyungnam Province	760
Zinc:			
In concentrate	Korea Zinc Industrial Group	Komdok near Tancheon and Sankok near Kowon, Hamgyongnam Province; Nakyong, Hwanhaenam Province	80
Refined	do.	Munpyong, Kangwon Province; Tancheon, Hamgyongnam Province	100

[e]Estimated; estimated data are rounded to no more than three significant digits.